Antimicrobial Resistance in Salmonella Is Associated with Increased Hospitalization; NARMS 1996-2000

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Background: Non-Typhoidal *Salmonella* is a leading cause of foodborne illness, and the prevalence of antimicrobial resistance has increased. Few studies have explored the human health consequences, other than treatment failures, associated with increasing resistance among *Salmonella*.

Methods: The Foodborne Diseases Active Surveillance Network (FoodNet) has conducted laboratory-based surveillance for Salmonella since 1996. In 2000, nine sites, representing 11% of the U.S. population, completed case reports on all Salmonella infections confirmed at one of the >400 laboratories in surveillance. Case reports included hospitalization status at the time of culture collection or up to seven days later. Clinical laboratories send isolates for serotyping to public health laboratories, which forward every 10th non-Typhoidal *Salmonella* to the National Antimicrobial Resistance Monitoring System (NARMS). NARMS performs susceptibility testing via broth microdilution using NCCLS standards for 14 antimicrobials. We linked susceptibility results from NARMS to FoodNet case reports.

Results: From 1996-2000, 15,653 cases of non-Typhoidal Salmonella were reported in FoodNet sites, and 1020 (7%) of these reports had both data on hospitalization and NARMS susceptibility results. Of these, 557 (55%) patients were female, and 163 (16%) were non-white. The median age was 25 years (inter-quartile range 5 to 42). The most common serotypes were Typhimurium (29%) and Enteritidis (19%). Isolates came from blood in 68 (7%), and hospitalization occurred in 238 (23%). Resistance to antimicrobials commonly used to treat Salmonella (cephalosporins, quinolones, or aminoglycosides) was found in 63 patients, 22 (35%) of whom were hospitalized. Patients with isolates resistant to one of these agents had a higher risk of hospitalization compared to patients with isolates susceptible to these agents (OR 1.8, 95% CI 1.1-3.2). Other risk factors for hospitalization included age, race, surveillance site, serotype, and bloodstream infection. After controlling for these factors in multivariate analysis, the association between resistance to one of these agents and hospitalization persisted (OR 2.0, 95% CI 1.1-3.7). Hospitalization also occurred more frequently in patients with isolates resistant to any antimicrobial, compared to those with pan-susceptible isolates (OR 1.5, 95% CI 1.0-2.2).

Conclusions: Antimicrobial-resistant *Salmonella* infections were associated with an increased risk of hospitalization, particularly when isolates were resistant to commonly used agents. Given the limited number of patients studied, further research should explore factors that may have contributed to increased hospitalization, including failure of empiric antimicrobial therapy, increased co-morbidity among patients infected with resistant bacteria, and increased virulence of resistant *Salmonella*.

Suggested citation:

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